Habitat Loss and Performance Degradation from Vessel Wake at NNBF/BU Sites

Dredging Operations Environmental Research (DOER) Program

U.S. ARMY CORPS OF ENGINEERS BUILDING STRONG®

Focus Area

Sediment Dredging Processes

Problem

Many near-channel habitat areas, beneficial use sites, and proposed green/gray infrastructure are impacted by vessel wake from navigation channels. Wake-induced transport processes must be included in methods developed to evaluate resilience, sustainability, and life-cycle management/cost for these sites. Sediment resuspension in or near sites may be beneficial (for strategic placement where transport is required) or detrimental (for existing habitat or direct placement sites where sediment stability is required).

Study Description

This project will include three components: 1) collection and analysis of available data (generally aerial photograph, LiDAR data, measured recession rates, AIS data, and wave data) near navigation channels with adjacent habitat, 2) field data collection/analysis of recession rates at habitat near navigation channels (DOER collaboration with NAP). And 3) develop engineering guidance and a series of screening level models to evaluate sediment stability, erosion, transport and fate from existing habitat as well as BU/EWN/RSM placement sites as a function of vessel wake energy, sediment characteristics, vegetation, and bathymetry for the purpose of evaluating management options. Models will be parameterized and validated using data from field sites. The models will permit inclusion of wave-blocking structures, such as oyster castles or dynamic features created as part of long-term sediment management strategies, to better evaluate alternative designs. Future work may involve incorporating the screening level algorithms or theories into more complex, regional hydrodynamic/wave/sediment transport models that include erosion in shallow water and intertidal zones.

Products

Guidance and tools for evaluating habitat loss/recession as a function of vessel traffic as well as methods to evaluate alternative designs which can mitigate these losses.

- TN: Evaluation of Marsh Edge Erosion Model
- TN Empirical Wave Transformation over Artificial Berm

Summary

Many near-channel habitat areas are impacted by vessel wake. Marsh edge erosion is a widely reported concern among USACE Districts charged with maintaining coastal wetlands for navigation and environmental sustainability. This work unit will produce a new tool to rapidly assess long-term marsh edge erosion rates to aid planners and other stakeholders engaged in restoration projects. Key features will permit users to assess erosion rates, determine sediment requirements, and define dredge material placement requirements to help reduce wave impacts.

Balancing operational and environmental initiatives and meeting complex challenges of dredging and dredged material placement in support of the navigation mission.

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